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Abstract :

This study explores the feasibility of setting up wind turbines on a part of Kappatagudda range of hills for generating electrical power for the grid. The 'Ridge-A', one among the six potential ridges of these hills identified for setting up wind turbines, is considered in this study since an approach road already exists, and wind velocity data has been generated by NAL for the last two years. The part of this ridge which belongs to the reserve forest where wind velocity data has been generated, extends for about 2.5 km. The ridge crest is virtually devoid of vegetation, and the surface is characterised as open scrub. The existing approach road limits the choice of wind turbines not exceeding 100 kW with each blade not longer than 9m. Wind velocity data from two sites on Ridge-A is analysed indicating that wind data of 1989 may be tentatively taken as an indicator of the mean of several years. Wind directions at the site are predominantly W/S-W and E/N-E which are well suited for close placement of machines in a single row along the ridge crest. A total of 5.9 MW potential is estimated for Ridge-A with '2XD' inter-machine spacing. At present, however, only 4 MW is considered feasible. Using wind distribution data along with design parameters of wind turbines of different makes in the range of 50-150 kW yielded a figure of 2,655 kWh/kW installed for power generation. This included reduced generation due to lower air density, reduced availability of 95%, and loss in generation due to closer placement of wind turbines. Budgetary cost data in respect of 100 kW wind turbines (based on 87% imports) under Alternative-A, and 55 kW units(20% imports) under Alternative-B is used in this study. Power from a group of five machines is pooled into one transformer station and transferred to 11 KV line which connects to 33 KV sub-station set up at the base of the hill. From here the power is carried on 33 KV line upto the proposed 'T' junction with the existing line between Gadag and Mundargi. The other cost components are formation of service road on the ridge crest, cost of transportation, erection, foundation and other associated activities. O&M costs are assumed as 1.3% of the total project cost, and in addition another 6% of the cost of machines as spares every five years. The cost of electricity assuming complete financing from loans (interest rates: 8-12%)is found in the range: Rs. 1.38-1.74/kWh under Alternative-A. The cost range is Rs. 2.06-2.50/kWh under Alternative-B. Other scenarios of equity participation and minimum internal rate of return yield minimum selling price of Rs. 1.30/kWh. Alterntively,assuming one rupeea unit as the fixed selling price would require a minimum of 25% capital support for the